Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Coronavirus Disease 2019 Test Correlation Between Nasopharyngeal Swab and BAL in Asymptomatic Patients

To the Editor:

The American College of Chest Physicians (CHEST) and the American Association of Bronchology and Interventional Pulmonology recommend testing for coronavirus disease 2019 (COVID-19) prior to performing bronchoscopy in asymptomatic patients where COVID-19 is present in the community.[1] Although the rate and availability of severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) testing have improved since COVID-19 was first detected in the United States, the reliability and interpretation of test results have been questioned; this is because of variable rates of community spread, varying test characteristics depending on site and technique, and the lack of a gold standard test. Specifically, discrepancies have been reported between nasopharyngeal (NP) and BAL SARS-CoV-2 positivity, with multiple case reports describing false-negative NP swabs among symptomatic patients who are eventually diagnosed with COVID-19.[2-4] The data are even more scant for such potential discrepancies among asymptomatic or presymptomatic patients, who seem to be responsible for a considerable amount of transmission, especially in close-quarters, high-risk environments.[5]

To our knowledge, no study has yet evaluated test concordance between NP swabs and BAL among asymptomatic patients living in a community with COVID-19 transmission. The current study reports the positive and negative rates of SARS-CoV-2 reverse transcription polymerase chain reaction (RT-PCR) results from NP swabs and BAL and their correlations among asymptomatic patients undergoing bronchoscopy.

Patients and Methods

The study was conducted at Stanford University Medical Center between April 13, 2020, and July 10, 2020. Our institution began NP swab testing of all asymptomatic patients prior to surgeries and procedures on April 6, 2020. All patients undergoing bronchoscopy, including inpatient and outpatient, were included.

All patients underwent NP swab SARS-CoV-2 RT-PCR for screening prior to scheduled bronchoscopy; for outpatient procedures, the NP swab was performed within 72 h of the procedure, and results were required to be negative. For inpatient bronchoscopy, a negative NP swab was required during the same hospital admission. At the time of bronchoscopy, SARS-CoV-2 RT-PCR was sent from a BAL sample. Paired NP and BAL samples from each patient were tested at the Stanford Health Care Clinical Virology Laboratory.

NP swabs were collected according to a standardized institution protocol using a unilateral NP sampling. BAL samples were collected from areas at the discretion of the proceduralists. For all bronchoscopic procedures, health care workers used personal protective equipment, including face shield, N-95 respirator mask, gown, and gloves. Rapid RT-PCR tests were performed with Cepheid Xpert Xpress SARS-CoV-2 targeting envelope (*E*)/nucleocapsid (*N2*) genes. Routine tests were done via the Stanford Health Care Emergency Use Authorization Laboratory Development Test targeting the *E* gene and the Hologic Panther Fusion system targeting the ORF1ab gene. Demographic, clinical, and microbiologic data were obtained from chart review. This study was approved by the Stanford Institutional Review Board (protocol #56060), and individual consent was not required.

Results

A total of 206 bronchoscopies were performed in 177 eligible patients. Eighteen patients underwent two or more bronchoscopies during the study period. All patients underwent a screening NP swab prior to the procedure and BAL during bronchoscopy. There was one positive NP swab in an asymptomatic patient whose outpatient bronchoscopy was therefore delayed. Among 206 cases for which the NP swabs were negative and therefore proceeded to bronchoscopy, all BAL SARS-CoV-2 RT-PCR test results were negative, showing 100% concordance between NP and BAL samples.

Demographic and clinical data are summarized in Table 1. The average age of patients was 59.0 years, with a male predominance; 158 of 177 patients (89.3%) were

TABLE 1] Baseline Demographic and Clinical Characteristics of 177 Patients

Parameter	Value
Age, mean ± SD, y	59.0 ± 14.5
Sex (male/female), No.	95/82
Comorbidities	
COPD/asthma	36 (20.3%)
Interstitial lung disease	32 (18.1%)
Lung transplant	66 (37.3%)
Cystic fibrosis	13 (7.3%)
Bronchiectasis	4 (2.3%)
Lung cancer	24 (13.6%)
Other malignancy	53 (29.9%)
Pulmonary hypertension	11 (6.2%)
Cardiovascular disease	31 (17.5%)
Hypertension	57 (32.2%)
Diabetes	34 (19.2%)
Medications	
Immunosuppressive medication	103 (58.2%)
Chemotherapy	21 (11.9%)
Inhaled corticosteroids	34 (19.2%)

from northern California. Sixty-six of 177 patients (37%) had a history of lung transplant, and 103 of 177 patients (58%) were taking immunosuppressive medications at the time of the procedure. The most common indication for bronchoscopy was lung transplant surveillance (45.1%) (Table 2). On average, the NP swab specimen was obtained 2 days prior to bronchoscopy. The majority (55.3%) of NP testing was performed by rapid/STAT testing, whereas all BAL tests were performed by routine testing. During the study period, our institution had a total of 92,008 COVID-19 diagnostic tests with 2,652 positive test results, for a positivity rate of 2.88%.

Discussion

This prospective study found no discordance between the initial negative NP test results and bronchoscopic BAL tests for SARS-CoV2 by RT-PCR in 206 consecutive bronchoscopies. These findings suggest that SARS-CoV-2 RT-PCR from NP swabs is an effective screening technique compared with BAL and support their use as the standard screening tests for patients with low clinical suspicion for COVID-19 who are undergoing bronchoscopy. Wang et al[6] described a SARS-CoV-2 detection rate from various biospecimens in 205 patients with COVID-19 and found BAL samples with a positive rate of 93%, nasal swabs with 63%, and pharyngeal swabs with 32%. However, their patient population only included patients with symptomatic COVID-19 disease, whereas the current study population was specifically screened to be negative for COVID-19. Thus, their report of discrepancies between NP and BAL testing is not contrary to our finding of significant concordance between paired samples of negative NP and BAL test results.

TABLE 2] Procedure Indications for 206 Bronchoscopies

Indications for Bronchoscopy	No. (%)
Lung transplant surveillance	93 (45.1)
Infection	59 (28.6)
Malignancy/nodule	46 (22.3)
Airway obstruction	16 (7.8)
Hemoptysis	10 (4.9)
Interstitial lung disease evaluation	8 (3.9)

Limitations of the current study include the difficulty in determining test characteristics of NP COVID-19 testing in the study population, in combination with the local incidence and prevalence among the patient population being tested. Furthermore, a study performed at our institution of testing in both asymptomatic and symptomatic patients found an estimated false-negative rate of 3.5% among initial NP swab tests if the test was repeated in 1 week.[7] Although all NP swabs were collected by trained health care workers, negative test results could have been due to inadequate specimen collection, handling, or processing.[8]

Conclusions

We found that all patients with low clinical suspicion for COVID-19 who tested negative for SARS-CoV-2 RT-PCR from NP swabs also tested negative for COVID-19 from BAL samples, with no test discrepancy between screening NP swabs and BAL. This finding supports the use of NP swab tests as an appropriate screening method for aerosol-generating procedures in the midst of the current pandemic.

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